





Capitol Dependable Boilers Square Type

UNITED STATES
RADIATOR ORPORATION

Detroit, Michigan

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From the collection of:

Mike Jackson, FAIA

The great economy and dependability of Capitol Boilers result from exacting care in the minutest detail

Tests, hundreds of them, made fairly and without prejudice, have proved conclusively that each type and size of Capitol Square Boilers is unsurpassed. No other is more economical of fuel, easier to operate, more dependable.

And we believe that when you know how Capitol Boilers are made you will agree that they are not only the equal but the superior of any built.

Capitol dependability starts with the very sand used for the moulds. Samples are taken from every lot and tested for uniformity of size and freedom from impurity.

Even the sand must be of highest grade All pig iron is selected through analysis. Molten iron is drawn from every cupola run and is tested for strength and chem-

ically analyzed to insure perfect metal for every Capitol Boiler.

After each section is cast, trim and true, water at eighty pounds pressure is forced into it to be certain no imperfection exists.

Then every boiler is completely assembled. The nipples, machined and checked by a dial micrometer to one thousandth of an inch, are fitted in. The doors are ground to close snugly.

The assembled boiler is given a final hydraulic

trial. Men search with flashlights for the slightest leak. And a "chalk test" determines to an infinitesimal degree the accuracy of the doors.

Every boiler completed, assembled, then tested

Only after the chief inspector, and he is the absolute Czar at the factories, gives his final O. K., can a Capitol boiler be

shipped. And before it is knocked down each section is stenciled assuring its faultless and easy re-assembly on the job.

Some of these steps in themselves may seem trivial. Combined, their importance cannot be over-estimated.

Scientific design saves fuel and reduces smoke They make a contribution to Capitol superiority as essential as the advanced design of Capitol Square Boilers: the

correct proportioning of draft openings; the long flue travel and the scientific shaping of the direct and indirect heating surfaces; the durable, easyshaking and dumping grates; the big doors; the easily cleaned flues.

It becomes doubly certain that all these more apparent advantages of Capitol Square Boilers must be the best known to the science of thermal efficiency when you realize what exacting attention is given the most minute details.

No other manufacturer in our knowledge goes so far to assure heating dependability and economy. This is the reason why United States Radiator Corporation can give with every Capitol Square Boiler, listed on the following pages, the strongest, most definite guarantee of heating satisfaction in the industry.

GUARANTEE

The United States Radiator Corporation will give an absolute guarantee in writing that Capitol Boilers will properly heat their full published amounts of "direct cast iron radiator loads in square feet," provided only that the boilers are connected to correctly installed systems and that the recognized standard requirements listed herein are followed. Should Capitol Boilers not meet these conditions, the additional capacity necessary will be supplied "without charge" by the

United States Radiator Orporation

Standard Requirements

A guarantee of size of boiler for specified amount of Direct Cast Iron Radiation must be based upon certain standard requirements.

Direct Cast Iron Radiation: It is assumed that Direct Cast Iron Radiation will emit 240 B. t. u. per hour for steam, and 150 B. t. u. per hour for water, therefore, all radiation must be reduced to this heat emission basis.

The amount of radiation required on this basis shall be computed as outlined in our catalog, or from methods adopted by either the Heating and Piping Contractors' National Association, or the American Society of Heating and Ventilating Engineers.

Corrections: Under ordinary conditions approximate corrections will reduce the following loads to their equivalent of Direct Cast Iron Radiation:

Wall Radiators on inside walls,
multiply by
Direct-Indirect, multiply by
Indirect, multiply by
Blast Coils - Determine condensation

Blast Coils — Determine condensation in pounds of steam per hour and multiply by 4.

Domestic Hot Water Supply—Where coils are used in fire box or small quantities of water heated. Storage tank capacity in gallons—for steam multiply by 2; for water multiply by 3.2.

Where large quantities of water are heated and indirect heaters used, requirements should be computed as outlined in our Engineering Data Book.

Allowances: The boiler size guaranteed for direct cast iron radiation includes allowances for heat loss of piping system and peak load. Where the actual surface in square feet of the piping system exceeds 25% of the Direct Cast Iron Radiation for steam, or 35% for water, additional allowances shall be made for the extra surface.

Draft: The boiler shall be attached to a chimney providing sufficient draft to consume with proper combustion the required amount of fuel per hour.

Fuel: The size of boiler recommended is based upon the use of a free-burning coal not smaller than nut size and having a heat value of at least 13,000 B. t. u. When the coal to be used has a heat value less than 13,000 B. t. u., the Direct Cast Iron Radiation shall be multiplied by the factor corresponding to heat value of the coal.

HEAT VALUE OF COAL IN B. T. U. PER POUND	FACTOR
13,000	1.00
12,500	1.07
12,000	1.14
11,500	1.21
11,000	1.29
10,500	1.37
10,000	1.46
9,500	1.56
9,000	1.67
8,500	1.79



No. 207 Capitol Steam Boiler

More heat from every pound of coal

Guaranteed to heat 350 to 750 square feet of radiation by steam and 580 to 1240 square feet by water,* the Series 200

is not surpassed by any boiler equal in size in the entire heating field.

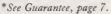
An intermediate section in the 200

Each section in Series 200 has an additional water bearing arch separated from the usual one by five self-cleaning flues. Thus all sides of it are in direct contact

with the full heat from the fire bed. After heating this great area of direct sur-

face, the gases are forced to pass back to the front through two side flues and return through a central flue.

The low water line, only 461/2 inches, makes this boiler ideal for installation in basements with low ceilings. Hard or soft coal, wood, coke, gas or oil can be efficiently burned. Additional sections can be added at any time up to the maximum capacity for this series.





No. 207 Capitol Water Boiler with front section removed

CAPITOL SQUARE BOILERS - SERIES

RADIATOR LOADS and DIMENSIONS

No.	Iron R Loads*	t Cast adiator Sq.Ft.	Grate Area Sq. Ft.	Coal Capacity Cu. Ft.	Minimum Chimney Height Feet	Minimum Chimney Dimensions Inches	Outlets and Inlets
204	350	580	2.59	4.36	35	8 x 12	2—3"
205	500	825	3.48	5.85	35	8 x 12	2—3"
206	625	1030	4.37	7.34	35	12 x 12	2—3"
207	750	1240	5.26	8.83	40	12 x 12	3—3"

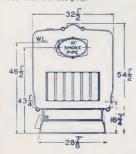
Inclusive of trimmings-HEIGHT 66 1/2 inches; WIDTH 45 inches.

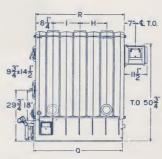
Height of Water Line, 461/2 inches.

Specify whether back or top outlet smoke hood is desired.

See Engineering Data book for size of chimney for batteries of boilers and amount of asbestos cement required to insulate each size of boiler.

*See Guarantee, page 7.





MEASUREMENTS

No.	H	I	Q	R
	Inches	Inches	Inches	Inches
204	121/2	6 ½	235/8	227/8
205		12½	297/8	29 1/8
206		18¾	361/8	35 3/8
207		12½	423/8	41 5/4

The above measurements are subject to slight variations in assembling. Ashpit dimensions on page 22.

ASSEMBLY 204 205 F-N-M-T-V-X-B

KEY TO SECTIONS

Front Section.

-Tapped front flue section with flow and return tappings.

Tapped middle section with flow, return and fusible plug tappings.

M-Piain middle section.

-Plain rear flue section

X - Tapped rear flue section with flow, safety valve and return tappings.

B—Back section. The return of the N section must be set on the left side; the return of the X section must be set on the right side. The return of the T section may be set on either side.

TAPPINGS

Flow and return tappings are 3 inches; a 2-inch heater tapping is now located on the face of the back section at the left of the smoke hood looking at the boiler from the front.



No. G-278

Capitol

Steam

Boiler

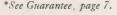
Low water line - high efficiency

With a water line lower than Series 200, it is often economical to substitute the slightly larger G-270 series where the difference saves the building of a pit.

It has the precise draft control, the exactly proportioned direct heating surface and the long flue travel of all Capitol Square Boilers. And like them, Series G-270 has an extra deep fire box. This Capitol advantage permits a bed of fuel so thick that it serves its full radiating capacity while

burning slowly and efficiently. Yet it has the reserve to meet the emergency of a quick drop in temperature. Further, the deeply banked fire retains sufficient live coke to eliminate the waste and labor of forcing the fire in the morning.

Guaranteed for radiating surface of 800 to 1350 square feet with steam and 1320 to 2220 square feet with water.* Burns any fuel economically.





No. G-278 Water Boiler with front section removed

RADIATOR LOADS and DIMENSIONS

No.	Direct Cast Iron Radiator Loads* Sq. Ft. Steam Water			Coal Capacity Cu. Ft.	Minimum Chimney Height Feet	Minimum Chimney Dimensions Inches	Outlets
G276	800	1320	5.32	7.93	40	12 x 12	2—4"
G277	980	1620	6.55	9.65	40	12 x 12	2—4"
G278	1160	1920	7.78	11.37	45	12 x 12	3—4"
G279	1350	2220	9.01	13.09	45	12 x 12	3—4"

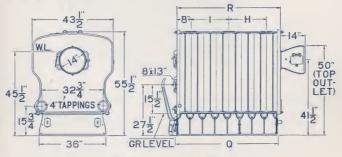
Inclusive of trimmings-HEIGHT 681/2 inches; WIDTH 503/4 inches.

Height of Water Line, 451/2 inches.

Specify whether back or top outlet smoke hood is required.

See Engineering Data book for size of chimney for batteries of boilers and amount of asbestos cement required to insulate each size of boiler.

*See Guarantee, page 7.



MEASUREMENTS

No.	H	I	Q	R
	Inches	Inches	Inches	Inches
G276	20 ¼ 20 ¼	20 1/4	35 15	35 78
G277		27	42 5/8	42 58
G278		13 1/2	49 5/6	49 38
G279		20 1/4	56	56 18

The above measurements are subject to slight variations in assembling. Ashpit dimensions on page 22.

ASSEMBLY

G276 F-S-M-M-X-B

G277 G278

F-S-M-M-M-X-B F-S-M-T-M-V-X-B F-S-M-M-T-M-V-X-B G279

KEY TO SECTIONS

-Front.

Tapped front flue with flow tapping.

-Plain middle.

-Tapped middle with flow tapping only.

Plain rear flue.

-Tapped rear flue with flow and safety valve tappings.

-Back.

TAPPINGS

Two 4-inch return tappings are located on the rear face of back section.

A 2-inch heater tapping is now located on the face of the back section at the left of the smoke hood looking at the boiler from the front.



No. 238 Capitol Steam Boiler

Huge capacity in a compact boiler with great heating surface

Turn back to page 10. Described there is the advanced Capitol principle which places Series 230 alone among boilers guaranteed for heating radiating surfaces of 1200 to 2500 square feet with steam, and with water, 1980 to 4125 square feet.

The Capitol grates deserve particular mention. A simple ratchet adjustment restricts them to a rocking action that sifts down all ash. With equal ease they may be turned nearly edgewise, dumping the fire. An ingenious method of anchoring them in place eliminates lost motion and the deafening noise so usual in shaking. And new grates may be dropped in through the large fire door. No dismantling is necessary.



The Capitol Grate

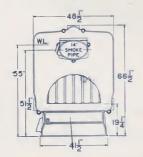


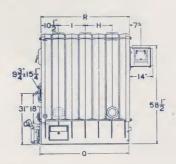
No. 238 Capitol Water Boiler with front section removed

RADIATOR LOADS and DIMENSIONS

No.	Direct C Iron Radi Loads* So Steam W	ator q.Ft.	Grate Area Sq. Ft.	Coal Capacity Cu. Ft.	Minimum Chimney Height Feet	Minimum Chimney Dimensions Inches	Outlets and Inlets
235 236 237 238 239 240	1500 2 1800 2 2100 3 2400 3	980 475 970 465 960 125	7.28 9.11 10.94 12.77 14.61 16.44	11.01 13.75 16.49 19.22 21.96 24.70	40 45 45 50 50 60	12 x 16 12 x 16 16 x 16 16 x 16 16 x 16 16 x 16	2—4" 2—4" 3—4" 3—4" 4—4"

Inclusive of trimmings—HEIGHT 78 inches; WIDTH 58¼ inches. Height of Water Line, 55 inches, Equipped with combination top and back outlet smoke hood. See Engineering Data book for size of chimney for batteries of boilers and amount of asbestos cement required to insulate each size of boiler. *See Guarantee, page 7.





MEASUREMENTS

No.	H	*H1	I	Q	R
	Inches	Inches	Inches	Inches	Inches
235 236 237 238 239 240	16 ¼ 24 ¾ 24 ¾ 24 ¾ 16 ¼	24 3/8	16 ¼ 24 ¾ 16 ¼ 16 ¼ 24 ¾ 16 ¼	37 7/8 45 7/8 53 7/8 61 7/8 69 7/8 77 7/8	37 1/8 45 1/4 53 3/8 61 1/2 69 5/8 77 3/4

*H1—Distance between third and fourth tappings. The above measurements are subject to slight variations in assembling. Ashpit dimensions on page 22.

235

ASSEMBLY

236 237 238 239

240

F-S-M-X-B F-S-M-M-X-B F-S-M-T-M-X-B F-S-M-T-M-V-X-B F-S-M-M-T-M-V-X-B F-S-M-T-M-T-M-V-X-B KEY TO SECTIONS

Tapped front flue with flow and return tappings. Plain middle.

MTV

Tapped middle with flow and return tappings only. Plain rear flue. Tapped rear flue with flow, return, and safety valve tappings.

TAPPINGS

A 2-inch heater tapping is now located on the face of the back section at the left of the smoke hood looking at the boiler from the front.



Reduces installation cost—lowers water line—increases efficiency

The 4100 series is an engineering triumph. The usual base section has been eliminated and the resulting advantages are obvious.

Installation is simplified. A pit is rarely required. Even the construction cost of the building itself is materially reduced. The exceptionally low water line, 49 inches, is the lowest practical for any room in which men can work, permitting foundations less deep than usual—an especially important economy where water, sand or rock makes excavating difficult and expensive.

The water carrying sections extending down to the floor, put to work the heat which sometimes goes to waste in the ash pit. These sections themselves carry the grate which extends the full length of the boiler. At every point the design of the 4100 series is equally efficient. Scientifically proportioned passageways are cast across the front section. Through them, pre-heated air from the ash pit is drawn in correct amounts and admitted just above the fuel bed. Thus the air which has passed up through the grates is supplemented with a fresh supply, rich in oxygen, and complete combustion of all unburned gases is secured.

The maximum heat value of the coal secured, the best use is then made of it. The gases after reaching the back, return to the front of the boiler through two bottom flues, then pass back through two top flues, giving up their heat to the water every inch of this triple-boiler length travel, before passing into the smoke hood.

A cool chimney gives evidence of the proved economy and the very large heating capacity guaranteed for the 4100 series Capitol Square Boilers.

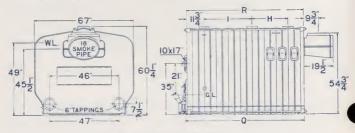


Sectional view showing combustion and fire travel in 4100 series

RADIATOR LOADS and DIMENSIONS

No.	Iron R	t Cast adiator Sq.Ft.	Grate Area Sg. Ft.	Coal Capacity Cu. Ft.	Minimum Chimney Height Feet	Minimum Chimney Dimensions Inches	Outlets
4106	2000	3300	10.31	13.30	45	18 x 18	2—5"
4107	2500	4125	12.47	16.30	50	18 x 18	2—5"
4108	3000	4950	14.63	19.25	55	18 x 20	2—5"
4109	3500	5775	16.79	22.25	60	20 x 20	3—5"
4110	4000	6600	18.95	25.20	65	20 x 24	3—5"
4111	4500	7425	21.11	28.20	70	24 x 24	3—5"

Inclusive of trimmings—HEIGHT 71 Inches; WIDTH 75 inches.
Height of Water Line, 49 Inches,
Equilped with combination top and back outlet smoke hood.
See Engineering Data Book for size of chimney for batteries of boilers and amount of asbestos cement required to insulate each size of boiler.
*See Guarantee, page 7.



MEASUREMENTS

No.	H Inches	I Inches	Q Inches	R Inches
4106 4107 4108	• • • •	16 16 24	46 15 54 15 62 15 62 15	46 16 54 16 62 16
4108 4109 4110 4111	24 24 32	24 32 32	70 15 78 15 78 15 86 15	70 16 78 16 86 16

The above measurements are subject to slight variations in assembling. Ashpit dimensions on page 22.

ASSEMBLY

- 4106 4107
- F-A-M-Y-V-B F-A-M-Y-V-V-B F-A-M-M-Y-V-V-B F-A-N-M-Y-V-V-X-B F-A-N-M-M-Y-V-V-X 4108 4109
- 4110 4111 F-A-N-M-M-Y-V-V-X-B

KEY TO SECTIONS

- Front. Tapped front flue with flow and water column tappings.
- Plain front flue.
- Plain middle Tapped safety valve section with flow and safety valve tappings. Plain rear flue.
- - Tapped rear flue with flow tapping. Back.

TAPPINGS

Two 6-inch return tappings are located approximately concentric with the lower nipple ports on the rear of the back section.

A 2½ inch heater tapping is now located on the face of the back section at the left of the smoke hood looking at the boiler from the front.



Correctly designed and built for heavy duty work

It is not sufficient to use one design for an entire range of boiler sizes merely enlarging the pattern for each series as capacity increases. If you have studied the preceding pages you have noticed how every Capitol series varies in some particular from the one next in size. The variances are all based on long experience and exact knowledge of thermal efficiency.

In the WN270 series, the differences are especially marked. On the simple principle that a shallow pan of water boils much more rapidly than a deep pan, the flue ways are broken up into many sections. With a greater area of water exposed, a greater amount of heat is absorbed from the gases as they pass through the flues, and the building is more quickly warmed in the morning with less fuel.

As the heated gases rise they circle in and out, all around the extended arch with six self-cleaning flues in each double section. They pass toward the back. And up. And forward through side flues, divided into four passageways. And



Sectional view showing efficient combustion and flue travel in Series WN 270

back again through two center flues, each divided into two passageways. When they finally leave the boiler they have given up the utmost heat to the water. The fuel wasted by ordinary boilers in heat escaping up the chimney is reduced to the vanishing point.

Series WN270 is guaranteed to heat 3700 to 8500 square feet of radiation by steam and 6105 to 14025 square feet by water.* In boilers of twelve sections or larger, a bridge-wall (which is designed for a fire-brick lining) is supplied.

RADIATOR LOADS and DIMENSIONS

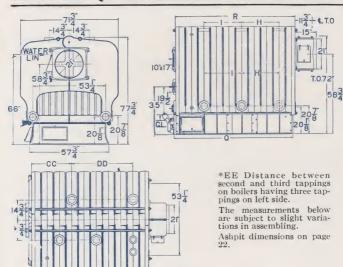
No.	Direct Cast Iron Radiator Loads* Sq.Ft. Steam Water		Grate Area Sq. Ft.	Coal Capacity Cu. Ft.	Minimum Chimney Height Feet	Minimum Chimney Dimensions Inches	Outlets and Inlets
WN276 WN277 WN278 WN279 WN280 WN281 WN282 WN283 WN284	3700 4300 4900 5500 6100 6700 7300 7900 8500	6105 7095 8085 9075 10065 11055 12045 13035 14025	15.25 18.29 21.33 24.37 27.41 30.45 30.45 30.45	24.66 29.67 34.68 39.69 44.71 45.96 47.21 48.46 49.72	50 55 60 60 65 70 70 75 80	20 x 24 24 x 24 24 x 24 24 x 24 24 x 28 28 x 28 28 x 28 28 x 32 32 x 32	3—5" 3—5" 3—5" 4—5" 4—5" 4—5" 5—5" 5—5"

Inclusive of trimmings—HEIGHT 92 inches; WIDTH 82 inches. Height of Water Line, 66 inches.

Specify whether back or top outlet smoke hood is required. See Engineering Data book for size of chimney for batteries of boilers and amount of asbestos cement required to insulate each size of boiler.

*See Guarantee, page 7.

BOILERS-SERIES CAPITOL SQUARE WN270



RIGHT SIDE			L	EFT SID			
No.	AA Inches	BB Inches	CC Inches	DD Inches	*EE Inches	K Inches	Q Inches
WN276 WN277 WN278 WN279 WN280 WN281 WN282 WN283 WN284	29 7/8 29 7/8 29 7/8 29 3/4 29 3/8 29 3/8 29 3/8 29 3/8 29 3/8	18 ¼ 18 ¼ 18 ¼ 27 ¾ 27 ¾ 45 ¾ 54 ¾	11 5/8 11 5/8 11 5/8 11 5/8 11 5/8 11 5/8 11 5/8 11 5/8 11 5/8	273/8 363/4 455/6 543/4 637/8 73 823/6 455/6 455/8	45 5/8 54 3/4	50 5/8 59 3/4 68 7/8 78 87 1/8 96 1/4 105 3/6 114 3/2 123 5/8	49 16 58 16 67 16 76 16 85 16 94 16 103 18 112 16

MEASUREMENTS

Lett Side—ASS	SEMBL	Y—Right Side
	WN276 WN277	F-R-M-T-Y-B F-R-M-T-M-Y-B
B-X-V-M-M-H-F	WN278	F-R-M-T-M-V-Y-B F-R-T-M-T-M-V-Y-B
B-X-V-M-M-M-M-M-H-F	WN279 WN280	F-R-M-T-M-T-M-V-Y-B
B-X-V-V-M-M-M-M-M-H-F	WN281 WN282	F-R-M-T-M-M-T-M-V-Y-B F-R-M-T-M-M-T-M-V-V-Y-B
	WN283 WN284	F-R-M-T-M-M-M-M-T-V-V-Y-B F-R-M-T-M-M-M-M-M-T-V-V-Y-B
VEV TO	O SEC	TIONS

F—Front.
R—R. H. Middle with water column tappings.
H—L. H. Tapped middle with flow and return tappings.
M—Plain middle.
T—Tapped middle with a return tappings.

BB

-AA

Tapped middle with flow and return tappings only.

Plain rear flue.
R. H. Rear flue with safety valve tappings.
L. H. Tapped rear flue with flow and return tappings.

-Back.

TAPPINGS

Two 5'' tappings are located on the rear face of back section. These tappings must be connected together with not less than 3'' pipe. A 3-inch heater tapping is now located on the face of the back section at the left of the smoke hood looking at the boiler from the front.

DIMENSIONS-CAPITOL SQUARE BOILERS ASHPIT



We recommend the construction of an ashpit similar to the above sketch with all Capitol square bollers, as 95% of burned grates are directly traceable to the accumulation of ashes under grates. Complete dimensions are given below.

A—Width of ashpit.

C—Length of base of boilers not employing bridgewall, also distance from outside of front base plate to front side of bridgewall on boilers employing bridgewall.

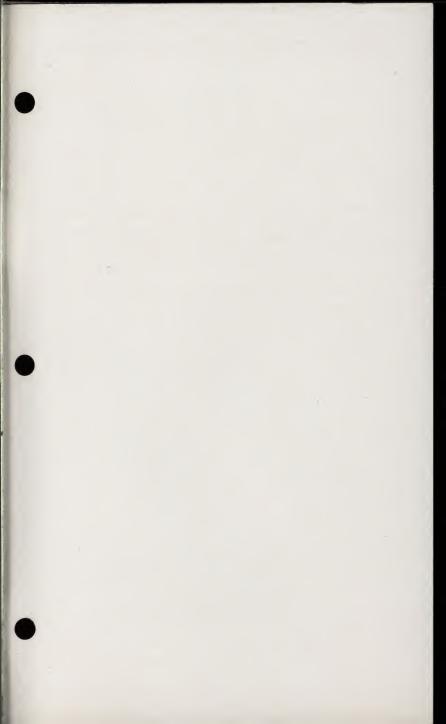
D—Distance from front side of bridgewall to outside of rear base plate by N270 boilers that employ a bridgewall which shortens ashpit dimensions.

E—Width of boiler base.

To provide proper foundation for boiler when basement floor is not laid, add 6 to 8 inches to dimensions C, D and E.

No.	A—Inches	B—Inches	C—Inches	E—Inches
204	23	18	24	28 7/8
205	23	24	301/4	28 7/8
206	23	301/2	361/2	287/8
207	23	361/2	4234	28 7/8
G276	30	30	361/4	36
G277	30	37	43	36
G278	30	431/2	491/2	36
G279	30	50	5614	36
235	351/2	32	381/4	411/2
236	351/2	40	46 1/4	411/2
237	351/2	48	54 1/4	411/2
238	351/2	56	62 1/4	41 1/2
239	351/2	64	70 1/4	411/2
240	351/2	72	78 1/4	411/2
4106	41	38	47 1/4	47
4107	41	46	55 1/4	47
4108	41	54	63 1/4	47
4109	41	62	71 1/4	47
4110	41	70	79 1/4	47
4111	41	78	87 1/4	47

-	No.	A—Inches	B—Inches	C—Inches	D—Inches	E—Inches
-	WN276	51	43	49 1/4		57 34
	WN277 WN278	51	52 61	58 14 67 1/4		57 94 57 84
	WN279	51	70	7614		57 84
	WN280	51	79	85 1/4		5734
	WN281 WN282	51	88 871⁄2	94 1/4	91/2	57 3/4
	WN283	51	871/2	93 84	181/2	57 34
	WN284	51	871/2	9384	21/2	5/%



UNITED STATES RADIATOR ORPORATION

GENERAL OFFICES: DETROIT, MICHIGAN BRANCH AND SALES OFFICES

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	*Columbus 478 Neilston St.
	*Columbus
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	*Pittsburgh 941 Behan St., N. S.
	*Portland, Me 2-4 Martyr St.
	*PORTLAND, Ore 16th St., North and Thurman St.
	*Providence Allen's Ave., Foot of Oxford St.
	*READING, PA Mifflin and Chestnut Sts.
	*Rochester
	*ST. Louis
	DI. I AUL
	*San Francisco 640 Second St.
	*SEATTLE 1248 First Ave., South
	*Springfield, Mass North Main St.
	*Troy Center St., Green Island, N. Y.
	Washington, D. C 410 Bond Bldg.
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*Assembly Plants located at points indicated by star.

Manufacturing Plants located in the following cities: Bristol, Pa.

—Corry, Pa.—Detroit, Mich.—Dunkirk, N. Y.—Edwardsville, Ill.—Geneva, N. Y.—Waukegan, Ill.—West Newton, Pa.